DEPARTMENT OF DEFENSE APPROPRIATIONS FOR FISCAL YEAR 2022

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

NONDEPARTMENTAL WITNESSES

[CLERK'S NOTE.—The subcommittee was unable to hold hearings on nondepartmental witnesses. The statements and letters of those submitting written testimony are as follows:]

PREPARED STATEMENT OF THE COALITION FOR NATIONAL SECURITY RESEARCH

Dear Chairman Tester and Ranking Member Shelby, and distinguished Members of the subcommittee, thank you for the opportunity to submit outside witness testimony as you begin to craft the fiscal year (FY) 2022 Defense Appropriations bill. The Coalition for National Security Research (CNSR) (https://cnsr4research.org/) is a broad-based alliance of more than 100 members from industry, academia, scientific and professional associations, and non-profits conducting vital scientific research to create new and improve existing technologies and capabilities to support the U.S. Department of Defense's (DoD) operations.

With nearly 70 percent of Research, Development, Test and Evaluation (RDT&E) conducted extramurally,[1] DoD relies on its partners such as CNSR members to perform the RDT&E that will provide the Department the technologies and capabilities it needs to secure our national security. If the United States military is to maintain its technological advantage during great power competition, it is imperative that we make robust investments in the Defense Science and Technology (S&T) enterprise, including strengthening the future defense workforce. As noted by the Defense Science Board (DSB), lower funding levels for Defense S&T could threaten the dominance of the U.S. military.[2]

FISCAL YEAR 2022 BUDGET REQUEST FOR THE DEFENSE S&T PROGRAM

The Biden-Harris Interim National Security Strategic Guidance states that the United States will double down on science and technology investments and support cutting-edge technologies and capabilities that will advance our military and national security in the future.[3] In addition, the National Defense Strategy (NDS) calls for establishing an unmatched twenty-first century national security innovation base and sustaining Joint Force military advantages.[4] Unfortunately, the FY 2022 budget fails to meet the commitment in the Interim National Security Strategic Guidance and request the appropriate resources to implement the NDS.

While the budget requests the RDT&E top line ever, it simultaneously calls for cutting Defense S&T funding within the larger portfolio by 13% or more than $2.1 billion. The budget also requests cutting defense basic research, the type of research that makes discoveries to enable future technologies and military capabilities, by 14.5% or more than $388 million. With China investing three times more annually in R&D than the U.S. and likely to be the world's top R&D performer in the near

[1] https://ncses.nsf.gov/pubs/nsf21329.
[2] https://dsb.cto.mil/reports/1990s/DefenseScienceandTechnologyBaseforthe21stCentury.pdf.
[3] https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/03/interim-national-security-strategic-guidance/.
[4] https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.

future,[5] now is not the time to cut funding for the DoD's primary programs that create new technologies and capabilities—as well as to help train the next generation defense workforce—to ensure the U.S. military maintains its global dominance.

The FY 2022 budget proposes more than just cutting the Defense S&T program below FY 2021 Congressionally enacted levels, it proposes to cut certain research programs below levels requested in the FY 2021 budget request. More specifically, DoD requested fewer resources compared to its last budget request for overall 6.1 defense basic research; Army University Research Initiatives; Army applied research; Navy basic research; Air Force basic research; Air Force applied research; DTRA Basic Research Initiatives; and Defense-Wide basic research. This de-emphasis on supporting the kind of research that maintains our technological and strategic advantage over adversaries developing advanced capabilities puts the military at a competitive disadvantage. Condoning this proposed budget will have many negative, sustained implications for our national security in the short-term and long-term.

CNSR urges Congress to reject cuts requested in the FY 2022 budget for the Defense S&T program and increase funding by least 6% over FY 2021 consistent with the recommendations from the National Defense Strategy Commission;[6] DSB;[7] National Security Commission on Artificial Intelligence (NSCAI);[8] National Academies;[9] Center for a New American Security (CNAS);[10] House Armed Services Committee's Future of Defense Task Force;[11] Council on Competitiveness;[12] and American Academy of Arts and Sciences.[13]

DEFENSE BASIC RESEARCH PE RECOMMENDATIONS

For decades, the defense basic research programs have provided the scientific breakthroughs to give the warfighter the weapons and infrastructure needed to succeed. Capabilities that help ensure our national security—such as advances in hypersonics testing, various quantum technologies, semiconductors critical to defense radar systems, solar cell efficiency, laser technologies, stealth capabilities, night vision, GPS, sonar, radar, precision munitions, biosensors, and near-real-time delivery of battlefield information—all derive from defense basic research.

We off the following recommendations for the key defense basic research PEs that serve as the foundation of the defense innovation pipeline necessary to maintaining the U.S military's global technological superiority.

[$ in thousands]

Agency—RDT&E	Program Element (PE)	FY21 PBR	FY21 Enacted	FY22 PBR	CNSR FY22 Request
Army	Defense Research Sciences	$303,257	$367,457	$297,241	$389,504
Army	University Research Initiatives	$67,148	$97,148	$66,981	$102,977
Army	University and Industry Research Centers	$87,877	$121,877	$94,003	$129,190
Army	Cyber Collaborative Research Alliance	$5,077	$5,077	$5,067	$5,382
Army	Artificial Intelligence and Machine Learning Basic Research	N/A	N/A	$10,183	N/A
Navy	University Research Initiatives	$116,816	$144,816	$117,448	$153,505
Navy	Defense Research Sciences	$467,158	$489,984	$484,421	$519,383
Air Force	Defense Research Sciences	$315,348	$325,348	$328,303	$344,869
Air Force	University Research Initiatives	$161,861	$196,861	$162,403	$208,673
Air Force	High Energy Laser Research Initiatives	$15,085	$15,085	$0	$15,990
Defense-Wide	DTRA Basic Research Initiatives	$14,617	$14,617	$11,828	$15,494
Defense-Wide	Basic Research Initiatives	$35,565	$75,565	$39,828	$80,099
Defense-Wide	National Defense Education Program	$100,241	$137,241	$112,195	$145,475

[5] https://ncses.nsf.gov/pubs/nsb20203.
[6] https://www.usip.org/sites/default/files/2018-11/providing-for-the-common-defense.pdf.
[7] http://www.dtic.mil/dtic/tr/fulltext/u2/a403874.pdf.
[8] https://www.nscai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf.
[9] https://www.nap.edu/catalog/11463/rising-above-the-gathering-storm-energizing-and-employing-america-for.
[10] https://www.cnas.org/publications/commentary/sharpening-the-u-s-militarys-edge-critical-steps-for-the-next-administration.
[11] https://armedservices.house.gov/—cache/files/2/6/26129500-d208-47ba-a9f7-25a8f82828b0/6D5C75605DE8DDF0013712923B4388D7.future-of-defense-task-force-report.pdf.
[12] https://www.compete.org/reports/all/202.
[13] https://www.amacad.org/sites/default/files/publication/resources/Perils-of-Complacency__Full-Report__1.pdf.

UNIVERSITY RESEARCH INITIATIVES

The FY 2022 budget request would cut University Research Initiatives (URIs) by more than 20% which means funding at levels below 2005, adjusted for inflation. Given that universities and colleges perform the majority (55%) of DoD-funded basic research,[14] the type of research that creates paradigm shifts in DoD's technological capabilities, cutting URIs this significantly will not only harm defense innovation efforts, but also workforce development since basic research funding often attracts the most creative minds in fields of critical interest to DoD.[15]

A program within URIs, the Multidisciplinary University Research Initiative (MURI) regularly produces revolutionary new military technologies and has become an essential skunkworks for create innovation.[16] Unfortunately, the FY 2022 budget request proposes to fund MURIs at levels below FY 2005, adjusted for inflation. This will only exacerbate the fact that the program is already dramatically underfunded. According to DoD, the MURI program received 365 proposals in FY 2020 but was only able to make 26 awards—leaving 339 proposals unfunded including 32 potentially game-changing research projects that were determined to be worthy of funding but were not due to a lack of appropriations. Not funding potentially revolutionary defense scientific research will hurt our ability to maintain global military technological superiority.

In addition, the situation is similar for the Defense University Research Instrumentation Program (DURIP), which provides infrastructure and equipment support to build universities' capacity to conduct defense-relevant research. The FY 2022 budget request proposes to fund DURIP at levels below FY 2010, adjusted for inflation, further underfunding this program. According to DoD, the DURIP program received 724 proposals in FY 2020 but was only able to make 172 awards—leaving a staggering 552 proposals unfunded including 229 critical infrastructure and equipment projects that were determined to be worthy of funding but were not funded due to a lack of appropriations. If universities and colleges do not have the infrastructure and equipment necessary to do unique defense research, the DoD will potentially lose its biggest source of support for developing new capabilities.

MINERVA RESEARCH INITIATIVE

The Minerva Research Initiative is DoD's signature social science basic research program that funds university-led teams to address problems of strategic importance to U.S. national security. As noted by DoD officials, because many national security challenges are driven by complex social dynamics, Minerva is an important source of new ideas to better understand social, behavioral, cultural, and political considerations that are inherent to our security and stability. Despite its importance, the FY 2022 budget request cuts funding for Minerva from $17 million to only $4 million within the Defense-Wide Basic Research Initiatives PE.

This cut is shortsighted for two main reasons. First, Minerva's research is aligned with and critical to carrying out the NDS in support of Department-wide priorities. Recently funded Minerva projects, such as "Russian Disinformation and Propaganda Campaigns" and "Empirical Analysis for Meeting Great Power Challenges" have given DoD unique insights that help shape future national security policies and better position the warfighter to navigate a complex global environment. Second, Minerva is another underfunded defense basic research program. According to DoD, in FY 2019, Minerva received 180 applications but only funded 15—at least 6 projects were determined to be worthy of funding but were not funded due to a lack of appropriations.

DEFENSE APPLIED RESEARCH PE RECOMMENDATIONS

Basic scientific research is just the first step in creating new or improving existing military technologies. Researchers, scientists, and engineers must apply the fundamental knowledge learned from basic research to solve complex military problems and develop the systems and components for potential solutions. To that end, we propose to highlight the success of the Defense-Wide Manufacturing Science & Technology PE, which the FY 2022 budget requests cuts of 45%. This PE provides DoD's contributions to the Manufacturing USA Institutes that help move discoveries from the nation's universities and research laboratories to the defense industrial base while strengthening the U.S. workforce. For example, DoD-funded institutes have demonstrated enhanced heat exchange capabilities for additive manufacturing, ad-

[14] https://ncses.nsf.gov/pubs/nsf21329.
[15] https://dsb.cto.mil/reports/2010s/BasicResearch.pdf.
[16] https://www.ida.org/idamedia/Corporate/Files/Publications/IDA.../STD/D-5361.pdf.

dressed cybersecurity supply chain issues, reduced weight of armor for military ground vehicles, and developed a first-of-its-kind advanced functional fiber to enable underwater communications.[17] In FY 2019, the Manufacturing USA Institutes conducted 561 major applied research and development projects of high priority to broad industry sectors. In addition, the network had more than 32,000 workers and students participate in education and workforce development activities. The Manufacturing USA Network is an example of a program supporting implementation of the NDS to enhance the domestic manufacturing and the defense industrial base. In order to ensure that discoveries made through basic research are translated into practical military technologies and capabilities, we offer the following recommendations for our priority applied research PEs.

[$ in thousands]

Agency—RDT&E	Program Element (PE)	FY21 PBR	FY21 Enacted	FY22 PBR	CNSR FY22 Request
Army	Lethality Technology	$42,425	$108,925	$64,126	General Support
Army	Soldier Lethality Technology	$125,435	$204,435	$105,168	General Support
Army	Ground Technology	$28,047	$154,047	$56,400	General Support
Army	Next Generation Combat Vehicle Technology	$217,565	$265,565	$172,166	General Support
Army	High Performance Computing Modernization	$188,024	$228,024	$189,123	General Support
Navy	Marine Corps Land Force Technology	$50,623	$55,623	$51,112	General Support
Navy	Common Picture Applied Research	$48,001	$43,703	$51,477	General Support
Navy	Warfighter Sustainment Applied Research	$67,765	$116,255	$70,547	General Support
Navy	Electromagnetic Systems Applied Research	$84,994	$92,994	$85,157	General Support
Navy	Ocean Warfighting Environmental Applied Research	$63,392	$80,284	$70,086	General Support
Navy	Future Naval Capabilities Applied Research	$167,590	$170,724	$173,356	General Support
Navy	Manufacturing Technology Program	$60,122	$60,122	$57,263	General Support
Navy	Advanced Undersea Prototyping	$115,858	$89,812	$58,473	General Support
Air Force	Materials	$140,781	$238,281	$113,460	General Support
Air Force	Human Effectiveness Applied Research	$115,222	$134,122	$136,273	General Support
Air Force	Aerospace Sensors	$211,301	$233,301	$174,683	General Support
Air Force	Directed Energy Technology	$128,113	$130,613	$121,869	General Support
Air Force	Dominant Information Sciences and Methods	$178,668	$215,668	$169,110	General Support
Air Force	High Energy Laser Research	$45,088	$29,208	$0	General Support
Defense-Wide	Cyber Security Research	$15,255	$25,255	$15,380	General Support
Defense-Wide	Defense-Wide Manufacturing S&T Program	$93,817	$245,817	$134,022	$260,566

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY (DARPA) RECOMMENDATIONS

DARPA's ability to create truly revolutionary new capabilities is well documented. AI, microelectronics, speech recognition, touchscreen displays, unmanned aerial vehicles, and advanced wireless capabilities all stem from DARPA-funded research. DARPA has worked with the academic community to create the Internet, computer chips critical to AI systems, self-driving cars, stealth technologies, metamaterials, and neuro-prosthetics. More recently, DARPA's research was partially responsible for developing RNA-based vaccines, which have been critical in the global response to COVID–19.[18] It is safe to say that the world would be a different place without DARPA-enabled research. CNSR strongly supports robust funding for DARPA. We recommend a funding level of $3.7 billion for DARPA to continue supporting game-changing scientific research.

Again, thank you for the opportunity to submit outside witness testimony as you develop the FY 2022 Defense Appropriations bill. Please do not hesitate to contact us if we can be of any assistance during the FY 2022 appropriations process.

PREPARED STATEMENT OF THE CONSORTIUM FOR OCEAN LEADERSHIP

On behalf of the Consortium for Ocean Leadership (COL), which represents our nation's leading ocean science, research, and technology organizations from academia, industry, and the larger nonprofit sector (to include philanthropy, associations, and aquariums), I appreciate the opportunity to submit for the record our fiscal year (FY) 2021 funding priorities for the Department of Defense (DOD).

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[17] https://www.nist.gov/publications/manufacturing-usa-20192020-highlights-report.

[18] https://www.appropriations.senate.gov/imo/media/doc/Tompkins%20Statement%20For%20The%20Record.pdf.

The United States is a maritime nation whose military and national defense are essential, not only to the security of our own country, but to the stability of global democracy. A key component of this continued success is our military's technological superiority, which has provided superior weapons and systems that offset size and geographic advantages of potential adversaries for more than 70 years. This extends to our dominance in the ocean environment. The late Admiral James D. Watkins, chief of naval operations from 1982–1986, used to stress that our superior knowledge of the undersea domain gave the United States the competitive advantage necessary for our victory in the Cold War.

Do we have that same competitive advantage in oceanography-which lets us understand the undersea environment-to outcompete an adversary today? As other nations, such as Russia and China, increase their investments in ocean-related research and development (R&D) spending, they threaten our leadership in this sector, which was once second to none. Advances in technology are necessary for us to observe, monitor, map, explore, and characterize our undersea environment; without those capabilities, we cannot maintain our competitive advantage. As a way to address the eroding competitive advantage in ocean science, the Navy established Task Force Ocean (TFO).

However, it is not just in the undersea domain where our science- and technology-induced dominance is eroding. This same runs true for our overall technological advantage, with DOD leaders testifying to other nations meeting and beating the United States in innovative and strategic capabilities. There are many who believe our gap in leadership is closing due to multiple factors, including both changes in composition of research and development funding as well as the growing technological skills of potential adversaries. While there are many efforts that must be taken to maintain our technological advantage (TFO being just one of them), one consideration that has been raised is the adequacy of DOD's investments in Research, Development, Test, and Evaluation (RDT&E).

While the president's budget request for FY 2022 includes a request for the largest increase ever for the RDT&E top line (4.5% over FY 2021 funding levels), this does not extend to the science and technology (S&T) budget within RDT&E. The S&T budget request includes a steep 13% decrease for the S&T budget compared to FY 2021 enacted levels, with basic research (6.1) and applied research (6.2) seeing a 14.5% decrease and advanced technology development (6.3) dropping 11.1%. Similar decreases are proposed within Navy's budget but with an 11.9% overall decrease to S&T: 8% for basic research, 17.5% for applied research, and 7.2% for advanced technology development.

These dramatic decreases in S&T funding would impact our nation's military superiority and our technological edge, and COL echoes the concerns and requests from testimony submitted by the Coalition for National Security Research (CNSR), which includes more than 100 members from industry, academia, scientific and professional associations, and nonprofits that advocate for a strong Defense S&T enterprise. As stated in CNSR's testimony, "With China investing three times more annually in R&D than the U.S. and likely to be the world's top R&D performer in the near future, now is not the time to cut funding for the DoD's primary programs that create new technologies and capabilities—as well as to help train the next generation defense workforce—to ensure the U.S. military maintains its global dominance."

I respectfully request the subcommittee reject the proposed Defense S&T cuts and instead increase funding by at least six percent over FY 2021 levels, in accordance with the CNSR request, which is consistent with recommendations from the National Defense Strategy Commission, the National Academies, the House Armed Services Committee's Future of Defense Task Force, and many others. I'd also like to highlight funding priorities for several program elements (PE) important to our defense ocean science and technology enterprise.

Defense Basic Research: University Research Initiatives

DOD supports basic research to advance fundamental knowledge in fields relevant to national defense. To accomplish this work, DOD has a strong relationship with academia, with universities and colleges performing 55% of DOD-funded basic research. The University Research Initiatives (URI) exist across the services to improve the quality of research and to support scientists and engineers necessary for our national defense needs. The proposed 20% cut to URI funding across the Army, Navy, and Air Force would put funding, when adjusted for inflation, at lower than 2005 levels. For Navy URI specifically, the budget request proposes an 18.9% decrease.

One of the Navy URI programs, the Defense University Research Instrumentation Program (DURIP), is a competitive annual grants process that supports university research infrastructure, including instrumentation essential for cutting-edge re-

search, that is necessary for high-quality research in the Navy's interests. Given the role colleges and universities play in performing the majority of DOD-funded basic research, it is critical they maintain the requisite infrastructure and equipment. DURIP's calls for proposals have only been able to fund a fraction of what is needed—in FY 2020, DURIP (including Army and Air Force DURIPs) funded 172 projects but left 552 proposals unfunded, including 229 critical infrastructure and equipment projects that were not funded simply due to a lack of appropriated funds, even though they were considered worthy of support. I respectfully request strong support for URI and at least an additional $20 million for Navy DURIP (PE 0601103N) in FY 2022.

Defense Applied Research: Task Force Ocean (PE 0602435N/Ocean Warfighting Environment Applied Research)

The Chief of Naval Operations launched Navy's Task Force Ocean (TFO) in 2017 to bolster the Navy's commitment to ocean science and technology by strengthening partnerships with academia and the private sector to advance ocean science relevant to Navy interests. Its goals and scope are based on the recognition that the entire U.S. ocean scientific and technological enterprise must be utilized to sustain our naval competitive advantage. I appreciate the subcommittee's support for TFO and respectfully request an increase of $10 million to the Ocean Warfighting Environment Applied Research, Navy RDT&E, Line 10, PE 0602435N for Research at Sea in Support of Task Force Ocean. This additional funding would enable more at-sea research that would help the Navy improve operations and meet its goals. It would allow for increased testing and demonstration of science and technology concepts (e.g., seagoing oceanography, acoustics, signal processing, uncrewed systems, and data analytics) and would more quickly move research to operations due to the increased number of scientists and projects able to go to sea.

Defense Applied Research: National Oceanographic Partnership Program (PE 0602435N/Ocean Warfighting Environment Applied Research)

For more than 20 years, the National Oceanographic Partnership Program (NOPP), established in the National Defense Authorization Act for Fiscal Year 1997, has been facilitating interagency and public-private partnerships and advancing large-scale collaborations in ocean research that address economic development, national security, quality of life, and science education. NOPP-supported projects have enabled unique partnerships between DOD, federal agencies, universities, and the private sector to help us understand our ocean, improving our understanding of strategic bathometric and natural processes that are essential to advanced ocean combat and security activities, particularly with respect to China's growing interest in ocean domination. NOPP has also helped grow the ocean-STEM pipeline through support of the National Ocean Sciences Bowl (described below) and significantly contributes to the buildout and modernization of the National Security Innovation Base. I greatly appreciate the Navy's continued support for NOPP and respectfully request an addition $8.7 million above the FY 2021 enacted level for a total of $17.5 million.

Finally, it is imperative that Navy STEM funding be prioritized and increased, as attracting, recruiting, and retaining a talented and diverse workforce is critical to operations. Building a diverse workforce capable of maintaining our military superiority does not start with support for those already in the STEM fields (which is an important component of it) but instead begins with bringing talented individuals to the pipeline. A series of workshops supporting the development of TFO's strategy and roadmap recommended investing in K–12 ocean-STEM initiatives—because the recruitment pipeline must begin prior to university training or military enlistment—as a mechanism to ensure the Navy has an adequate ocean science workforce in the coming decade.

However, most high schools don't include Earth or ocean sciences as part of their formal coursework; while 98% and 94% of high schools offer disciplinary biology and chemistry courses, respectively, only 48% offer environmental or Earth science courses. Therefore, it is up to informal education programs to build interest and knowledge in ocean science and careers in ocean science and engineering. It is crucially important for the Office of Naval Research (ONR) to increase investment in informal ocean education programs. For example, ONR is a founding sponsor of the National Ocean Sciences Bowl (NOSB), but support for such educational programs—as with ocean science as a whole—has not been able to keep pace with the need for talent in this field. In its 24-year history, the NOSB, a program of COL and a quiz-bowl style ocean science competition for high schoolers, has introduced tens of thousands of students to the possibility of a career in ocean science years before they might have otherwise considered it as a career path (if at all). By supporting

the NOSB, the Navy can engage a future skilled workforce capable of enhancing maritime domain awareness and exploring viable solutions to the growing challenges facing our ocean and planet. I respectfully request an additional $50 million to support ONR's K–12 STEM education efforts.

Thank you for the opportunity to submit testimony and for your time and consideration, as maintaining our nation's competitive advantage in the maritime domain is of utmost importance.

CONSORTIUM FOR OCEAN LEADERSHIP MEMBERS

Alaska Ocean Observing System
Alaska SeaLife Center
Aquarium of the Pacific
ARCUS
ASV Global, LLC
Bermuda Institute of Ocean Sciences
Bigelow Laboratory for Ocean Sciences
Chevron USA
College of William & Mary (VIMS)
Columbia University (LDEO)
Consumer Energy Alliance
Cooperative Institute for Research in Environmental Sciences
Dauphin Island Sea Lab
Duke University
Earth2Ocean
East Carolina University
Esri
Estuary & Ocean Science Center, San Francisco State University
Exocetus Autonomous Systems
FAU Harbor Branch Oceanographic Institute
Florida Institute of Oceanography
Harte Research Institute
Hubbs-SeaWorld Research Institute
IEEE Oceanic Engineering Society
Institute for Global Environmental Strategies
IOOS Association
JASCO Applied Sciences
L–3 MariPro, Inc.
Liquid Robotics, Inc.
Louisiana State University
Louisiana Universities Marine Consortium
MARACOOS
Marine Technology Society
Massachusetts Institute of Technology
Monmouth University Urban Coast Institute
Monterey Bay Aquarium Research Institute
Moss Landing Marine Laboratories
Moore Foundation
Mystic Aquarium
National Ocean Industries Association
NERACOOS
New England Aquarium
North Carolina State University
North Pacific Research Board
Nova Southeastern University
Ocean Aero, Inc.
Old Dominion University
Oregon State University
Pennsylvania State University
Rutgers University
Saildrone
Savannah State University
Schmidt Ocean Institute
Sea-Bird Scientific
Severn Marine Technologies, LLC
Shell
Skidaway Institute of Oceanography of UGA
Sonardyne, Inc.
South Carolina Sea Grant Consortium
SURA
Stanford University
Stony Brook University
Texas A&M University
ThayerMahan
U.S. Arctic Research Commission
U.S. Naval Postgraduate School
University of Alaska Fairbanks
University of California, Davis
University of California, San Diego (Scripps)
University of California, Santa Barbara
University of California, Santa Cruz
University of Delaware
University of Florida
University of Hawaii
University of Maine
University of Maryland Center for Environmental Science
University of Massachusetts, Dartmouth
University of Miami
University of New Hampshire
University of North Carolina, Chapel Hill
University of North Carolina, Wilmington
University of Rhode Island
University of South Carolina
University of South Florida
University of Southern California
University of Southern Mississippi
University of Texas at Austin
University of Washington
University of Wisconsin, Milwaukee School of Freshwater Sciences
Vulcan, Inc.
Woods Hole Oceanographic Institution

[This statement was submitted by Dr. Alan P Leonardi, President and CEO, Consortium for Ocean Leadership.]

PREPARED STATEMENT OF THE FOREIGN INTELLIGENCE SURVEILLANCE COURT

Dear Chair Tester, Ranking Member Shelby, and Members of the Senate Defense Appropriations Subcommittee:

Thank you for the opportunity to submit testimony concerning the public availability of significant Foreign Intelligence Surveillance Court (FISC) decisions, orders, and opinions. The FISC rules on government requests to conduct domestic electronic surveillance pursuant to the Foreign Intelligence Surveillance Act. Unlike traditional courts, whose opinions and orders are publicly available by default, the FISC's decisions, orders, and opinions (hereinafter "opinions") are routinely kept secret.

A cornerstone of any democracy is the rule of law, which requires that laws be available to the public. This is the method through which the public consents to the law and creates a feedback mechanism through which law is made to reflect popular will. To the extent the FISC issues rulings that interpret and expand upon laws enacted by Congress, those substantive opinions must be publicly available for the democratic process to work.

The role of the FISC has expanded over the decades to include issuing substantive opinions, but laws governing transparency of those opinions have been slow to keep up. For example, there was controversy over mass surveillance in 2013 arising in part from decisions of the FISC, which prompted Congress to debate new transparency and accountability measures intended to ensure the FISC's opinions are sound and reflect Congressional intent.[1] Ultimately, Congress chose to amend the Foreign Intelligence Surveillance Act in 2015 to provide for more transparency.

Specifically, Congress directed the release of significant FISC decisions, orders, and opinions. Section 402 of the USA Freedom Act of 2015 requires the Director of National Intelligence, in consultation with the Attorney General, to "conduct a declassification review of each decision, order, or opinion issued" by the Foreign Intelligence Surveillance Court "that includes a significant construction or interpretation of any provision of law."[2] Accordingly, the FISC has published some materials online.[3]

The original scope of section 402 is unclear. Was it to apply to all opinions or only opinions from 2015 forward? Regardless, the Executive branch took the position that the law should not be understood to apply to all rulings, but only those from 2015 forward. Thus, Congress, the public, and litigants before the FISC have some access to recent substantive opinions, but virtually no access to an unknown number of prior, substantive rulings by the Court. These earlier decisions have precedential effect.

We believe, within the framework established in law, that all of the FISC's substantive rulings should be publicly available, regardless of when they were issued.

This view is shared by the House of Representatives and the Senate, which both passed legislation requiring disclosure of substantive FISC opinions last Congress as part of the USA FREEDOM Reauthorization Act of 2020.[4] A disagreement over an unrelated matter prevented that bill from becoming law.

Section 301 of the draft USA FREEDOM Act, as engrossed by the House of Representatives, provided for a declassification process for all substantive opinions.

"Section 602 of the Foreign Intelligence Surveillance Act of 1978 (50 U.S.C. 1872) shall apply with respect to each decision, order, or opinion issued by the Foreign Intelligence Surveillance Court or the Foreign Intelligence Surveillance Court of Review before, on, or after the date of the enactment of such section. With respect to such decisions, orders, or opinions issued before or on such date, the Director of National Intelligence shall complete the declassification review and public release of each such decision, order, or opinion pursuant to such section by not later than one year after the date of the enactment of this Act." (emphasis added).

The Senate passed identical language. As mentioned above, the House requested a conference committee to address other matters, but the Senate did not concur and the legislation died.

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[1] Reform of the Foreign Intelligence Surveillance Courts: A Brief Overview, Congressional Research Service Rpt. R43451 (March 31, 2014). https://www.everycrsreport.com/reports/R43451.html.

[2] USA FREEDOM Act of 2015, P.L. 114–23. https://www.congress.gov/bill/114th-congress/house-bill/2048.

[3] See Public Filings—U.S. Foreign Intelligence Surveillance Court, United States Foreign Intelligence Surveillance Court (accessed May 12, 2021). https://www.fisc.uscourts.gov/public-filings.

[4] USA FREEDOM Reauthorization Act of 2020, H.R. 6172. https://www.congress.gov/bill/116th-congress/house-bill/6172/text/eh.

We note there is ongoing litigation to provide for transparency concerning FISC opinions. A petition to the U.S. Supreme Court, filed by ACLU lawyers, former Solicitor General Ted Olson, the Knight First Amendment Institute at Columbia University, and the Media Freedom and Information Access Clinic at Yale University, "argue[d] that the First Amendment gives the public a presumptive right of access to significant judicial opinions, including those of the FISC."[5]

This is a matter best resolved by Congress. The FISC is a creation of the Legislative branch and the determination of what should be made publicly available should be made by the people's representatives. In our view, such direction is best grounded in Congress's policy-making function, not the Court's remedial function concerning Constitutional violations.

The Defense Appropriations Act for FY 2022 is the best route to address transparency concerning all significant FISC opinions. In addition, this request is within the scope of work traditionally performed by appropriators. We are requesting the Director of National Intelligence be directed to provide all significant decisions, orders, and opinions to appropriators pursuant to the already existing legal framework, and to make them publicly available as part of that process. Appropriators routinely request reports from agencies on matters of public interest and direct that they be publicly available. Because Defense Appropriations has jurisdiction over the Office of the Director of National Intelligence, we make this request of you.

Please direct the Director of National Intelligence to report to Congress and to make publicly available all current and historical decisions, orders, and opinions as described in Section 402 of the USA Freedom Act of 2015 (50 U.S.C. 1871(a)(5)) within one year of enactment of the Appropriations Act.

Thank you again for the opportunity to submit this testimony.

PREPARED STATEMENT OF THE HALO TRUST

Please Support $19 Million for the Humanitarian Demining Research and Development Program.

As the world's largest humanitarian demining organization, The HALO Trust leads the effort to protect lives and restore livelihoods for those affected by conflict. We remove and destroy landmines and other explosive remnants of war and help secure weapons that could fall into the hands of terrorist groups. Since 2002, HALO has partnered with the U.S. Department of Defense's (DOD) Humanitarian Demining Research and Development (HD R&D) Program in more than ten countries and territories. This program, implemented by the U.S. Army, specializes in developing and testing innovative technologies to detect and clear landmines, unexploded ordnance (UXO), and improvised explosive devices (IEDs). These technologies increase the effectiveness, efficiency, and safety of demining operations for military and humanitarian use—saving lives and taxpayer money.

The HD R&D team designs technologies to respond to technical challenges in the field, drawing from new commercial technology, equipment currently in use by the DOD, and advanced sensor technology available only through other DOD R&D programs. They then trial prototypes in real field conditions through partnerships with the Department of State's (DOS) humanitarian demining programs. During field evaluations, operators provide feedback on the functionality and effectiveness of the equipment. This allows HD R&D to modify and improve the equipment and increase the U.S. technical capacity to respond to explosive threats.

HD R&D produces four specific outcomes. First, the field evaluation process collects data that helps to improve detection technologies used by the U.S. Armed Forces. Second, successfully trialed equipment is used to train and equip explosive disposal units of the U.S. military and allied militaries. By equipping partner militaries to address their own explosive threats, U.S. soldiers are more likely to remain out of harm's way. Third, HD R&D equipment saves civilian lives from landmines, most frequently children, and amplifies the impact of American assistance by increasing the amount of clearance performed on DOS projects without increasing costs. Fourth, the HD R&D program supports American jobs by utilizing American manufactured machines and products when possible in their equipment development process.

The HD R&D Program has a track record of success, having performed nearly 240 operational field evaluations in 43 countries since 1995. The program is responsible for developing advanced technology for the Handheld Standoff Mine Detection Sys-

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[5] The Public Should Have Access to the Surveillance Court's Opinions, by Charlie Hogle and Alex Abdo, Just Security (April 19, 2021). https://www.justsecurity.org/75809/the-public-should-have-access-to-the-surveillance-courts-opinions/.

tem, which combines metal detection with ground penetrating radar, the rotary mine comb, designed to efficiently excavate low metal content anti-vehicle mines, and TRAXX, built to cut through hard-to-see tripwires and lift mines from soil. Overall, HD R&D equipment has been used to clear more than 19,000 acres of land, and to destroy more than 226,000 mines and UXO.

As you know, HD R&D now receives funding from the following account: *Research, Development, Test & Evaluation, Army/Advanced Component Development & Prototypes/PE: 0603920A/Program Title: Humanitarian Demining.* Due to strong bipartisan support, the program received $17 million in Fiscal Year 2021. However, the FY22 President's Budget proposes only $8.649 million for HD R&D, which would represent a 49% decrease from the previous year, and the lowest funding level in over ten years. This proposed funding reduction would substantially curtail the ability of the HD R&D program to develop necessary demining equipment that would otherwise create cost savings on State Department demining contracts and protect our soldiers.

This program has a long list of unfunded projects it is waiting to trial, including anti-tank mine detection equipment in Afghanistan and magnetic technology in Iraq. Further, this program recently moved under Army Futures Command and will now be subject to an Army tax that will cut into its program budget, unless this new expense is offset through a higher appropriation this year. Thus, even flat funding the program at a level of $17 million would result in reduced resources for technological advances required by military and humanitarian deminers.

We appreciate the support this subcommittee has provided for this valuable program, and urge the subcommittee to raise funding to a level of $19 million in FY22 for HD R&D. This additional funding will improve the ability of U.S. soldiers and our allies' ability to safely detect and clear landmines, UXO, and IEDs. This funding is especially important as new conflicts uncover new threats in areas like the Middle East, Libya, and Ukraine.

Thank you for your consideration of this request.

[This statement was submitted by Chris Whatley, Executive Director, The HALO Trust (USA).]

PREPARED STATEMENT OF THE MELANOMA ACTION COALITION

Dear Chairman Tester and Ranking Member Shelby:

The Melanoma Action Coalition thanks you for supporting the Defense-funded melanoma research in the Fiscal Year 2021 Defense Appropriations bill and requests that the Senate Defense Appropriations Subcommittee provide $40 million for melanoma research in the Fiscal 2022 Department of Defense Appropriations bill. This program is funded within the Defense Health account.

The Melanoma Action Coalition represents more than 40 community-based foundations and advocates nationwide focused on increasing awareness about melanoma, providing education about sun safety, and raising funds for melanoma research. Each of us has been touched personally by melanoma. Some of us are survivors; others have lost spouses or children to this disease. We are united by our dedication to working towards a time when no other individuals or families suffer the pain and loss that we have experienced.

Melanoma is a unique and major threat to our military community, who carry out their missions in environments of extreme solar radiation. Decades of studies from WWII to the current generation of war fighters confirm the linkage of this exposure to the development of deadly melanoma. Continued innovation in melanoma prevention, detection, and treatment is only possible with continued investment in high quality research.

A 2000 "Annals of Epidemiology" study comparing mortality among WWII veterans of the Pacific and European Theaters found that Pacific Theater Prisoner of War veterans had an estimated 3 times greater risk of dying from melanoma than veterans of the European Theater.[1] The article concluded that these data are "consistent with the hypothesis that exposure to high levels of solar radiation in young adulthood is associated with a higher risk of melanoma mortality."[2]

According to The Pulse, the online source for the Uniformed Services University, "melanoma is the most significant cancer to affect the active duty military popu-

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[1] Page, William F., David Whiteman, and Michael Murphy. "A comparison of melanoma mortality among WWII veterans of the Pacific and European theaters." Annals of epidemiology 10, no. 3 (2000): 192–195.

[2] Ibid.

lation."[3] A Vanderbilt School of Medicine study cites that only 22 percent of military personnel were made aware of the risks of sun exposure, 77 percent reported being exposed to bright sunlight for more than 4 hours a day, and only 27 percent had regular access to sunscreen.[4] The study concluded that "the past decade of United States' combat missions, including operations in Iraq and Afghanistan, have occurred at a more equatorial latitude than the mean center of the United States population, increasing the potential for ultraviolent irradiance and the development of skin cancer."[5]

Recent studies have borne out these conclusions. A study published in the Military Service Monthly Report found that in a 10-year surveillance period from 2005 to 2014, malignant melanoma was one of the most frequent cancer diagnoses among male service members, and the second most frequent cancer diagnosis among female service members.[6] Another 2014 Military Medicine Study found that the overall incidence rate of melanoma in active duty military personnel between 2000 and 2007 was 62 percent greater than among the general population during the same period.[7]

Given the clear threat melanoma poses to our service members, and the volume of high-quality research proposals, the Melanoma Action Coalition respectfully requests that the committee provide $40 million for melanoma research in the Fiscal Year 2022 Defense Appropriations bill.

Thank you for considering this important request. Should you have any questions, please contact me at: contact@melanomaactioncoalition.org.

Sincerely.

[This statement was submitted by Neil Spiegler, President, Melanoma Action Coalition.]

PREPARED STATEMENT OF THE NATIONAL MULTIPLE SCLEROSIS SOCIETY

Mr. Chairman and Members of the Subcommittee, thank you for this opportunity to provide testimony on behalf of the National Multiple Sclerosis Society (Society) regarding Department of Defense (DoD) Appropriations for fiscal year 202 (FY22). We are pleased to be able to discuss the importance of the research funded by the Multiple Sclerosis Research Program (MSRP) to those affected by MS.

Thank you for the investment that you have provided for the MSRP. Past Committee investments have allowed the program to fund a new clinical trial award mechanism and expand its focus to identify triggers and risk factors for MS. As you consider funding priorities for FY22, we urge the Subcommittee to provide $20 million for the MS Research Program (MSRP) within the Congressionally Directed Medical Research Programs (CDMRP). This is the same funding level that Congress awarded the program last year and we believe that this funding level will ensure the greatest return on investment in the program and maintain funding consistency for MS researchers.

Multiple Sclerosis (MS) is an unpredictable, often disabling disease of the central nervous system that interrupts the flow of information within the brain, and between the brain and body. Symptoms range from numbness and tingling to blindness and paralysis. The progress, severity, and specific symptoms of MS in any one person cannot yet be predicted. Nearly one million Americans live with MS and most people with MS are diagnosed between the ages of 20 and 50, with women being diagnosed at two to three times higher more often than men.

The Society mission is to cure MS while empowering people affected by MS to live their best lives. To accomplish this, the Society funds cutting-edge research, drives change through advocacy, facilitates professional education, collaborates with MS organizations around the world, and provides programs and services designed to help people with MS and their families live their best lives. We see ourselves as

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[3] Mason, V. (2018). Improving the Detection of Melanoma in Active Duty Military. [online] The Pulse. Available at: https://usupulse.blogspot.com/2018/02/improving-detection-of-melanoma-in.html [Accessed 26 Feb. 2020].

[4] Powers JG, Patel NA, Powers EM, Mayer JE, Stricklin GP, Geller AC. Skin cancer risk factors and preventative behaviors among United States military veterans deployed to Iraq and Afghanistan [published online ahead of print June 25, 2015]. J Invest Dermatol. doi: 10.1038/jid.2015.238.

[5] Ibid.

[6] Lee, T., V. F. Williams, and L. L. Clark. "Incident diagnoses of cancers in the active component and cancer-related deaths in the active and reserve components, US Armed Forces, 2005–2014." MSMR 23, no. 7 (2016): 23–31.

[7] Lea, C. Suzanne, Jimmy T. Efird, Amanda E. Toland, Denise R. Lewis, and Christopher J. Phillips. "Melanoma incidence rates in active duty military personnel compared with a population-based registry in the United States, 2000–2007." (2014): 247–253.

a fundamental partner to the U.S. government in many critical areas—particularly in the arena of MS research. To date, the Society has invested over $1 billion dollars in research, and we work in coordination and collaboration with our federal partners at the National Institutes of Health (NIH) and the MSRP to ensure that the best research is funded and that there is no overlap or duplication.

The CDMRP is a peer-reviewed program funded through the Department of Defense via the Defense Appropriations Act. Individual programs like the MSRP are funded at the direction of Congress and fill research gaps by funding high impact, high-risk and high gain projects that other research agencies—like the NIH, may not venture to fund. The CDMRPs are distinctive in that they involve active participation of people living with the program disease area. These patients and patient representatives are highly coveted roles, as they are involved in all areas of the program—from establishing the mission/vision of the program, to reviewing applications and making recommendations for funding, and evaluating the impact of the program. People living with MS value the opportunities within the MSRP as a way they can engage in the research process. The Society applauds the way MSRP structure is designed and believes that it aligns with the direction of patient centered drug development and care in the research and drug development ecosystem.

MS Prevalence and Military Service

The Society confirmed that nearly one million people are living with MS in the United States, more than twice the original estimate from previous studies.[1] Extrapolating figures this estimate, we believe there are approximately 70,000 veterans in the U.S. that live with MS. Each year, the Veterans Health Administration provides care to more than 20,000 veterans living with MS. Additionally, between the years 2009–2018, over 2,400 active-duty service members, reserve, and National Guard members received a new diagnosis of MS within the military health system (MHS).[2] Including other DOD beneficiaries such as former Service members and family members, the MHS had more than 21,000 new cases of MS. During this period, more than 36,000 DOD beneficiaries had over 1.1 million outpatient encounters and 537,000 hospital bed days for MS within the MHS.[3] In addition, the Department of Veterans Affairs Multiple Sclerosis Centers of Excellence, East and West branches, serve approximately 49,000 Veterans with MS.[4]

MS is considered a presumptive condition and veterans who have symptoms of MS in the military or within seven years after honorable discharge are eligible for the service-connected status. To date, approximately 12,000 U.S. veterans have a service-connected disability for MS, meaning that their MS was incurred or aggravated during their military service. An advisory committee by the Veterans Administration recommended further study into the potential link between combat service and increased risk of developing MS. The Society supports this recommendation and believes that more research is needed that examines the longer time impact for those who have served, from veterans from the Vietnam War through to those who served in Operation Enduring Freedom, Iraqi Freedom and New Dawn. To appropriately monitor this cohort of servicemen and women, the Society recommends that Congress ensure that information and data can be easily shared between the U.S. Department of Veterans Affairs and the Department of Defense. Because the demographics of the military have changed over the past several decades, it is more critical these two Agencies can share data in real time to examine health impacts and needs by age, race, ethnicity and sex/gender.

Research into the underlying causes of MS and improving methods of diagnosing, treating and potentially curing MS is critical to improving the lives of those serving in the military and all of those living with MS. As the underlying cause of MS is still unknown, MSRP funded research will help improve knowledge about those currently serving in the military who can be deployed to areas and environments that may increase the risk of developing neurologic diseases like MS. Further, MRSP

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[1] Mitchell T. Wallin, William J. Culpepper, Jonathan D. Campbell, Lorene M. Nelson, Annette Langer-Gould, Ruth Ann Marrie, Gary R. Cutter, Wendy E. Kaye, Laurie Wagner, Helen Tremlett, Stephen L. Buka, Piyameth Dilokthornsakul, Barbara Topol, Lie H. Chen, Nicholas G. LaRocca. Neurology Mar 2019, 92 (10) e1029-e1040; DOI: 10.1212/WNL.0000000000007035.

[2] Williams VF, Stahlman S, Ying S. 2017. Multiple sclerosis among service members of the active and reserve components of the U.S. Armed Forces and among other beneficiaries of the Military Health System, 2007–2016. MSMR Aug; 24(8): 2–11.

[3] Data includes both direct care (care received at Military Treatment Facilities) and purchased care (care received at Civilian facilities that is covered by TRICARE). Data does not include care received while deployed, or any care received outside of the Military Health System that was not processed through TRICARE.

[4] Gromisch ES, et al. Who is not coming to clinic? A predictive model of excessive missed appointments in persons with multiple sclerosis. Mult Scler Relat Disord. 2020 Feb;38:101513.

supported projects will also improve understanding on how to counter these environmental triggers to improve the readiness and deployability for future service personnel.

Multiple Sclerosis Research Program

The MRSP was established by Congress in 2009. Its vision is to prevent, cure, reverse, or slow the progression, and lessen the personal and societal impact of MS. Like many of the other programs within the CDMRP, the MSRP specifically encourages applications that address critical needs of the MS community and concentrate on: the biological basis of disease progression, risk factors leading to the prevention of MS, drug discovery and biomarkers for preclinical detection of MS. MSRP research has led to four patent applications and patents. To date, Congress has appropriated approximately $73.1 million dollars to the MSRP, including $16 million for FY20. The total MSRP investment since 2009 has funded 111 awards, 98 projects, 4 clinical trials and 3 patents. MSRP funded investigators have been awarded 47 follow-up research grants from federal and non-federal research partners, including the NIH and the Society, totaling over $34 million to build on and advance knowledge gained from the initial MSRP funded grant.

MSRP funds studies that examine gap in MS from basic science to rehabilitation research. A particular area of interest in MS research is imaging technology, as diagnosis of MS and tracking disease progression remains challenging, both for active-duty military personnel, veterans and civilians. Magnetic resonance imaging (MRI) is often used by health care providers to track disease activity. Currently, MRI findings are not accepted by the Food and Drug Administration as indicators of clinical meaningfulness in the MS drug development and approval process and more research is needed in the form of more long-term studies correlating brain MRI with disability progression.

Additionally, a growing body of evidence have implicated environmental, genetic factors, age, and microbial infections in the development of MS. Recent MRSP funded studies have examined alternations in the gut microbiota and suggest that these alterations influence the onset and progression of autoimmune diseases like MS. This information will be incredibly useful to people with MS, who often ask about the impact of dietary and lifestyle changes to help manage MS symptoms and reduce the occurrence of relapses.

This body of research that will improve MS diagnosis and the drug development process, by answering questions that are important to people living with MS. Further, MSRP funded research allows the healthcare system to better track disease progression and activity, allowing healthcare providers in both the military and civilian populations to better anticipate the needs of people living with MS. The clinical application of the research done at MSRP is particularly important—as MRSP also funds novel research to expedite much needed symptom management treatments for those living with MS. Further, the clinical application of this research will facilitate better conversations surrounding troop readiness and the ability of an individual to deploy.

Due to the impact the MSRP has had on driving both novel research into MS and its focus on funding innovative research focused on the development of potential therapies to improve diagnosis and treatment of MS, the Society requests that Congress continue to fund the MSRP at $20 million in FY22.

On behalf of the Society, thank you to this Committee for its investment in the CDMRP, particularly the MSRP. We appreciate the opportunity to provide written testimony and our recommendations for FY22 appropriations for the program. The MSRP is of vital importance to people living with MS and we look forward to continuing to work with the Committee to help move us closer to a world free of MS.

[This statement was submitted by Leslie Ritter, Associate Vice President, Federal Government Relations, National Multiple Sclerosis Society.]

PREPARED STATEMENT OF THE NEUROFIBROMATOSIS NETWORK

Thank you for the opportunity to submit testimony to the Subcommittee on the importance of continued funding for the Department of Defense's Peer-reviewed Neurofibromatosis (NF) Research Program (NFRP). NF is a terrible genetic disorder closely linked to many common diseases widespread among the American population. The highly successful Neurofibromatosis Research Program has shown tangible results and direct military application with broad implications for the general population.

On behalf of the Neurofibromatosis (NF) Network, a national organization of NF advocacy groups, I speak on behalf of the 120,000 Americans who suffer from NF

as well as the millions of Americans who suffer from diseases and conditions linked to NF such as cancer, brain tumors, heart disease, memory loss, bone abnormalities, deafness, blindness, and psychosocial disabilities, such as autism and learning disabilities. Thanks in large part to this Subcommittee's strong support, scientists have made enormous progress since the discovery of the NF1 gene in 1990 resulting in clinical trials now being undertaken by the NFRP.

In Fiscal Year 2022, we are requesting at least $25 million to continue the Army's highly successful Neurofibromatosis Research Program (NFRP). The NFRP is now conducting clinical trials at nation-wide clinical trials centers created by NFRP funding. These clinical trials involve drugs that have already succeeded in eliminating tumors in humans and rescuing learning deficits in mice. In addition, in March 2020, the Food and Drug Administration approved the first ever drug, co-developed by NIH and AstraZeneca, with seed money from the NFRP, for the treatment of plexiform tumors in neurofibromatosis type 1 (NF1). Administrators of the Army program have stated that the number of high-quality scientific applications justify a much larger program. For these reasons, it is imperative that we continue to invest in research if we are to advance toward treatments and a cure for the numerous diseases associated with NF.

WHAT IS NEUROFIBROMATOSIS?

NF is an unpredictable genetic disorder of the nervous system that affects almost every organ system in the body. There are three types of NF: NF1, which is more common, NF2, which initially involves tumors causing deafness and balance problems, and Schwannomatosis, the hallmark of which is severe pain. NF causes tumors to grow along nerves including in the skin, just below the skin, and in the brain and spinal cord. NF is the most common neurological disorder caused by a single gene and affects more people than Cystic Fibrosis, hereditary Muscular Dystrophy, Huntington's disease and Tay Sachs combined. It strikes worldwide, without regard to gender, race or ethnicity. Approximately 50 percent of new NF cases result from a spontaneous mutation in an individual's genes and 50 percent are inherited.

NF can cause a myriad of devastating clinical problems including nerve and brain tumors; disfiguring skin growths; inability to heal after bone fracture, which may ultimately require amputation; psychosocial disabilities, including autism and learning disabilities; unmanageable chronic pain; deafness; blindness; cardiovascular defects; vascular disease; and paralysis. NF gene mutations are also important 'drivers' of cancers in the lungs, liver, brain and breast.

NF'S CONNECTION TO THE MILITARY

Neurofibromatosis (NF) has become a clinical 'model' for advancing medical research. The genetic information learned from NF holds the key to understanding a number of health issues that benefit the war fighter, as well as the general population, including cancer, bone fracture and repair, vascular disease, nerve regeneration, behavior and psychosocial issues, and pain.

The Neurofibromatosis Research Program (NFRP) is providing critical research that directly benefits the War Fighter including:

Bone Repair.—At least a quarter of children with NF1 have abnormal bone growth in any part of the skeleton. In the legs, the long bones are weak, prone to fracture and unable to heal properly; this can require amputation at a young age. Adults with NF1 can have low bone mineral density, placing them at risk of skeletal weakness and injury. The NFRP is a strong supporter of NF1 bone defects research and as a result this field has made significant progress in the past few years. Bone fractures sustained by the war fighter and how to repair them is of interest to the military. Research studies will identify new information about understanding bone biology and repair and will pave the way to new strategies to enhancing bone health and facilitating repair.

Pain.—Severe and unmanageable pain is seen in all forms of NF, particularly in schwannomatosis, and significantly impacts quality of life. NF research has shown similarities between NF pain and phantom limb pain. NFRP funding has been critical in supporting this. Chronic pain, and how to treat it effectively, is one of the most poorly understood areas of medicine but has very high relevance to those in the military recovering from service-related injuries. NF Research in this area could help identify new ways to target pain effectively with the right drugs or therapies.

Vascular Disease.—NF1 elevates the risk of vascular disease including aneurysm, stroke and vessel occlusive disease. NF1 predisposes patients to early cardiovascular disease, which is also the leading cause of death among United States Veterans. NF research has demonstrated that when treating affected NF mouse models with an antioxidant medication it reduced vessel disease. Discoveries related to cardio-

vascular disease in NF1 are likely to be more broadly informative, including for veterans and active duty military personnel.

Psychosocial and Cognitive Disabilities.—In the last couple of years, NFRP research has revealed common threads between NF1 learning disabilities, autism and other related disabilities. Research being done within the NF Clinical Trials Consortium, NFRP created clinical centers, has led to important findings and expanded research in this area. This research contributes to our broadening understanding of how brain signaling can impact on behavior and psychosocial difficulties. Members of the military returning from service can suffer from psychological trauma and it is not easy to understand how this can be effectively treated. As we learn more from the NF population about psychosocial function, we will be able to shed light on this area for the benefit of the military.

Nerve Tumors and Repair.—Nerves are the most common location for tumor development amongpatients with NF1, NF2, and schwannomatosis. Tumor growth alone, or treatments for the same, commonly cause nerve injury and associated deficits. Identifying mechanisms to improve nerve repair would benefit patients with NF, as well as advance the science needed to better treat nerve injury common in warfighters.

THE ARMY'S CONTRIBUTION TO NF RESEARCH

While other federal agencies support medical research, the Department of Defense (DOD) fills a special role by providing peer-reviewed funding for innovative and rewarding medical research through the Congressionally Directed Medical Research Program (CDMRP). CDMRP research grants are awarded to researchers in every state in the country through a competitive two-tier review process. These well-executed and efficient programs, including the NFRP, demonstrate the government's responsible stewardship of taxpayer dollars.

Recognizing NF's importance to both the military and to the general population, Congress has given the Army's NF Research Program strong bipartisan support. From FY1996 through FY2021 funding for the NFRP has amounted to $382.85 million, in addition to the original $8 million appropriated in FY1992. In addition, between FY1996 and FY2019, 430 awards have been granted to researchers across the country.

The Army program funds innovative, groundbreaking research which would not otherwise have been pursued, and has produced major advances in NF research, including conducting clinical trials in a nation-wide clinical trials infrastructure created by NFRP funding, development of advanced animal models, and preclinical therapeutic experimentation. Because of the enormous advances that have been made as a result of the Army's NF Research Program, research in NF has truly become one of the great success stories in the current revolution in molecular genetics. In addition, the program has brought new researchers into the field of NF. However, despite this progress, Army officials administering the program have indicated that they could easily fund more applications if funding were available because of the high quality of the research applications received.

In order to ensure maximum efficiency, the Army collaborates closely with other federal agencies that are involved in NF research, such as the National Institutes of Health (NIH). Senior program staff from the National Institute of Neurological Disorders and Stroke (NINDS), for example, sit on the Army's NF Research Program Integration Panel which sets the long-term vision and funding strategies for the program. This assures the highest scientific standard for research funding, efficiency and coordination while avoiding duplication or overlapping of research efforts.

Thanks in large part to this Subcommittee's support, scientists have made enormous progress since the discovery of the NF1 gene. Major advances in just the past few years have ushered in an exciting era of clinical and translational research in NF with broad implications for the general population. These recent advances have included:

—In March 2020 the Food and Drug Administration approved the first ever drug, co-developed by NIH and AstraZeneca, with seed money from the NFRP, for the treatment of plexiform tumors in neurofibromatosis type 1 (NF1).

—Phase II and Phase III clinical trials involving new drug therapies for both cancer, hearing tumors, vision tumors, bone graft and cognitive disorders.

—Establishment of the Neurofibromatosis Clinical Trial Consortium which includes an operation center and 25 clinical sites. Allows for partnerships with well-established NF Centers, pooling expertise and resources, quicker turn arounds of scientific reviews and regulatory approvals, leveraged work with pharmaceutical companies all towards the common goal of new treatments and a cure for Neurofibromatosis.

—Successful elimination of tumors in NF1 and NF2 mice with the same drug.
—Development of advanced mouse models showing human symptoms.
—Rescue of learning deficits in mice with an already existing well known drug.
—Determination of the biochemical, molecular function of the NF genes and gene products.
—Connection of NF to numerous diseases because of NF's impact on many body functions.

FISCAL YEAR 2022 REQUEST

The Army's highly successful NF Research Program has shown tangible results and direct military application with broad implications for the general population. The program has now advanced to the translational and clinical research stages, which are the most promising, yet the most expensive direction that NF research has taken. Therefore, continued funding is needed to continue to build on the successes of this program, and to fund this promising research thereby continuing the enormous return on the taxpayers' investment.

We respectfully request that you include at least $25 million in the Fiscal Year 2022 Department of Defense Appropriations bill for the Peer-reviewed Neurofibromatosis Research Program. With this subcommittee's continued support, we will prevail. Thank you for your support.

[This statement was submitted by Kim Bischoff, Executive Director, Neurofibromatosis Network.]

PREPARED STATEMENT OF THE OVARIAN CANCER RESEARCH ALLIANCE AND THE SOCIETY OF GYNECOLOGIC ONCOLOGY

The Ovarian Cancer Research Alliance (OCRA) and the Society of Gynecologic Oncology (SGO) thank the Subcommittee for the opportunity to submit comments for the record regarding our funding recommendations for the Department of Defense Ovarian Cancer Research Program, which is under the Department of Defense Congressionally Directed Medical Research Program. We respectfully request a funding level of $45 million for the Department of Defense Ovarian Cancer Research Program in Fiscal Year 2022.

The Ovarian Cancer Research Alliance (OCRA) works every day to fund cures, foster community, further conversations and, ultimately, the cause. OCRA is the oldest and largest global organization dedicated to fighting ovarian cancer. We advance research to prevent, treat and defeat ovarian cancer. We support women and their families before, during and beyond diagnosis. And we work with all levels of government to ensure that eradicating ovarian cancer is a priority.

The Society of Gynecologic Oncology (SGO) is a national medical specialty organization of physicians who are trained in the comprehensive management of women with malignancies of the reproductive tract. The SGO's mission is to prevent and treat gynecologic cancers with equity, thereby improving lives through advocacy, engagement, education, research, and collaboration. The SGO's strategic goals include advancing the prevention, early diagnosis, and treatment of gynecologic cancers by establishing and promoting standards of excellence.

OVARIAN CANCER'S DEADLY STATISTICS

Ovarian cancer is the fifth leading cause of cancer-related death in women and the deadliest gynecologic cancer. The American Cancer Society estimates that in 2021, approximately 21,410 women in the U.S. will receive a new diagnosis of ovarian cancer and approximately 13,770 women will die from the disease. Nearly 25 percent of women diagnosed with ovarian cancer will die within a year, and less than 50 percent will survive five years. There is currently no early detection test for ovarian cancer so more than 85 percent of women are diagnosed at late stage when survival is significantly decreased. When women experience a disease recurrence there are limited treatment options with life altering side effects and suboptimal efficacy.

OVARIAN CANCER'S IMPACT ON THE MILITARY

Of the 850,000 female service members, wives of active duty military and adult daughters of active duty military, approximately 11,800 will be diagnosed with ovarian cancer over the course of their lifetimes. Over the last five years alone, nearly 2,600 members of our military or their families have been hospitalized for ovarian cancer or suspected ovarian cancer. It is clear that the cost of ovarian cancer to our military is great, not only in terms of troop readiness, but also in terms of cancer

care costs: treating all of these cases of ovarian cancer over these patients' lifetimes could cost TRICARE an estimated $971.2 million. Therefore, it is imperative that the Department of Defense pursues the scientific discoveries that help readiness and address both the personal and economic costs of ovarian cancer.

DOD OCRP: A PROGRAM THAT COMPLEMENTS NON-DEFENSE OVARIAN CANCER RESEARCH

The Department of Defense Ovarian Cancer Research Program (DoD OCRP) was initiated in Fiscal Year 1997 to support high-impact, cutting-edge research that fills unmet needs. The DoD OCRP establishes priorities to target the most critical needs along the research development pipeline from basic to translational to clinical research, including clinical trials, and to push the field of ovarian cancer forward through its vision to "eliminate ovarian cancer".

The DoD OCRP complements but does not duplicate the important ovarian cancer research carried out by the National Cancer Institute (NCI). First, the DoD OCRP funds innovative, high risk, high reward research which many large, non-DoD Federal research agencies do not have the flexibility to engage in. For ovarian cancer research, we believe that the DoD OCRP is the sole funding source for innovative, groundbreaking research with an emphasis on promoting readiness for military members and their families as well as the overall health of citizens of the United States and the world.

Second, the DoD OCRP is designed to prevent funding research that overlaps with other ovarian cancer research that has been funded by the NCI, other agencies, or private foundations. Before funding an award, DoD OCRP grant managers at the DoD are required to thoroughly check all sources of information to determine if a proposal is redundant of a previous DoD OCRP grant or a grant awarded by another federal agency such as the NCI or by a private foundation.

Third, the DoD OCRP pushes investigators to make rapid progress in their research by requiring them to reapply every funding cycle. Because proposal reviews conducted by the DoD OCRP are double blinded by investigator and research institution, an investigator's progress is evaluated on its own merit and must have sufficient new findings, data, or ideas to warrant new funding.

Cancer research performed by the DoD has been responsible for fundamentally changing the way cancer research is conducted. Many innovative practices and methods created by the Congressionally Directed Medical Research Programs have been adopted by the other research agencies, such as the use of cancer patients as consumer reviewers in the proposal review process.

Also, the Congressionally Directed Medical Research Program has created funding mechanisms to incentivize research, such as the Idea Award, that fills voids in our understanding of cancer. Additionally, large ovarian cancer research teams do not exist in many academic medical or research centers. In order to provide much needed mentoring, networking and a peer group for young ovarian cancer researchers, the DoD OCRP created an Ovarian Cancer Academy award in Fiscal Year 2009. The DoD OCRP Ovarian Cancer Academy is growing and meeting its potential of developing a unique, interactive virtual academy that provides intensive mentoring, national networking, and a peer group for junior faculty. The overarching goal of this award is to develop young scientists into the next generation of successful and highly productive ovarian cancer

researchers within a collaborative and interactive research training environment including collaboration with research conducted at military healthcare institutions.

DISCOVERIES AND ADVANCEMENTS IN OVARIAN CANCER

From Fiscal Year 1997–Fiscal Year 2020, the DoD OCRP has received $371.5 million in Congressional appropriations. Through Fiscal Year 2019, the DoD OCRP has funded 479 research awards, resulting in over 1,583 peer-reviewed publications and 103 patent applications. The DoD OCRP has funded key studies that have led to several new discoveries and advancements in the treatment and understanding of ovarian cancer. These advancements have spanned treatment with FDA approval of rucaparib, an oral therapy for treatment of advanced ovarian cancer, to OVA1, a blood test combined with imaging that can better identify patients at high risk for malignant ovarian cancer. The studies have also served as the basis for the universal ovarian cancer patient genetic testing recommendations.

FUTURE DIRECTION AND STRATEGIC GOALS IN OVARIAN CANCER RESEARCH

The DoD OCRP's Strategic Plan is centered around the scope of the ovarian cancer problem affecting military and veteran populations and all women affected by the disease, as well as the pressing research gaps faced by the ovarian cancer community. The DoD OCRP's ultimate goal is to prevent, detect, treat, and cure ovarian

cancer. The following research goals identified in the DoD OCRP Strategic Plan are critically important to improving patient care and winning the war against this deadly disease:

—Promote readiness for military members and their families as well as the overall health of citizens of the United States and the world.
—Enhance and sustain the pool of ovarian cancer scientists.
—Promote research that will address health disparities and improve access to quality care and the physical and psychosocial well-being of those diagnosed with ovarian cancer.
—Utilize precision medicine and computational approaches that identify individual tumor characteristics and predictive biomarkers across diverse groups to optimize patient care and outcomes.
—Develop or improve the performance of screening and diagnostic approaches.
—Understand the precursor lesion/stem cell, microenvironment, and pathogenesis/progression of all types of ovarian cancer, including rare subtypes.
—Develop and validate models to understand initiation, progression, metastasis, treatment response, and recurrence of ovarian cancer.
—Increase long-term survivorship and improve quality of life throughout the continuum of ovarian cancer care.
—Promote research that focuses on cancer risk and primary prevention.
—Investigate tumor and host response to therapy, including tumor survival, dormancy, cell death, clonal evolution, resistance, and immune factors.
—Promote synergistic team science, including: the OCRP Ovarian Cancer Academy supporting early career ovarian cancer investigators, consortia, and collaboration with intramural and extramural DoD programs.

THE IMPACT OF THE COVID–19 PANDEMIC ON CANCER RESEARCH

The COVID–19 pandemic has had a devastating effect on cancer research in addition to the tremendous public health and economic toll it has extracted. A new study published in January of this year in the Journal of the American Medical Association (JAMA) Network Open indicates that during the first wave of the pandemic last spring, the number of newly launched cancer treatment studies dropped by 60%, and that does not include the number of cancer trials that were suspended, delayed, or in which enrollment rates were drastically reduced. According to the JAMA article, the number of ongoing trials fell by approximately 50% last spring.

For these reasons, The Ovarian Cancer Research Alliance and the Society of Gynecologic Oncology are requesting a $10 million increase for the DoD Peer-Reviewed Ovarian Cancer Research Program, resulting in a total funding request of $45 million in FY 2022, to preserve current investments in ovarian cancer research and continue the program's successful work to improve prevention, early diagnosis, and survival rates from ovarian cancer.

CONCLUSION

The Ovarian Cancer Research Alliance and the Society of Gynecologic Oncology maintain a long-standing commitment to work with Congress, the Administration, and other policymakers and stakeholders to improve the survival rate from ovarian cancer through education, public policy, research, and communication. Please know that we appreciate and understand that our nation faces many challenges and that Congress has limited resources to allocate; however, we owe it to those who bravely served our country to pursue promising research that will improve treatments for ovarian cancer and improve the survival rate from this deadly disease.

On behalf of the entire ovarian cancer community—patients, family members, clinicians, and researchers—we thank you for your leadership and support for federal programs that seek to reduce and prevent suffering from ovarian cancer. Thank you in advance for your support for $45 million for the Department of Defense Ovarian Cancer Research Program in FY 2022.